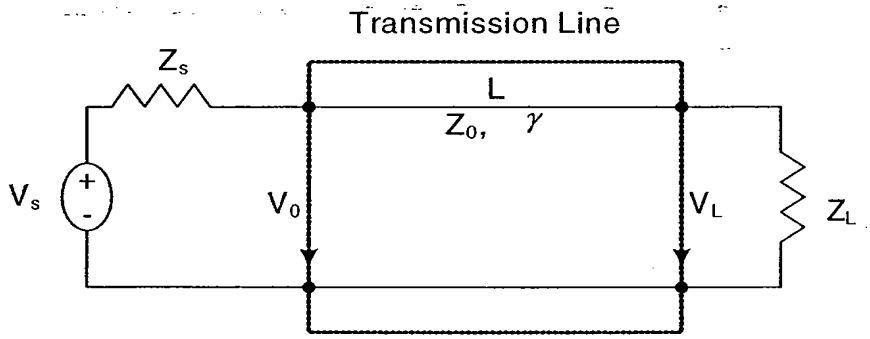
Transmission Line
Z_s
L
Z_0, γ
V_s
V_0
V_L
Z_L

Fig. 1

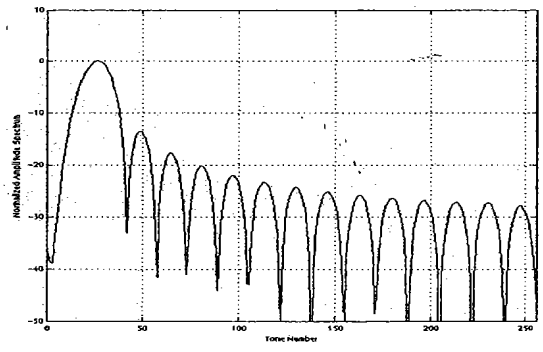
10
0
-10
-20
-30
-40
-50
0
50
100
150
200
250

Fig. 2

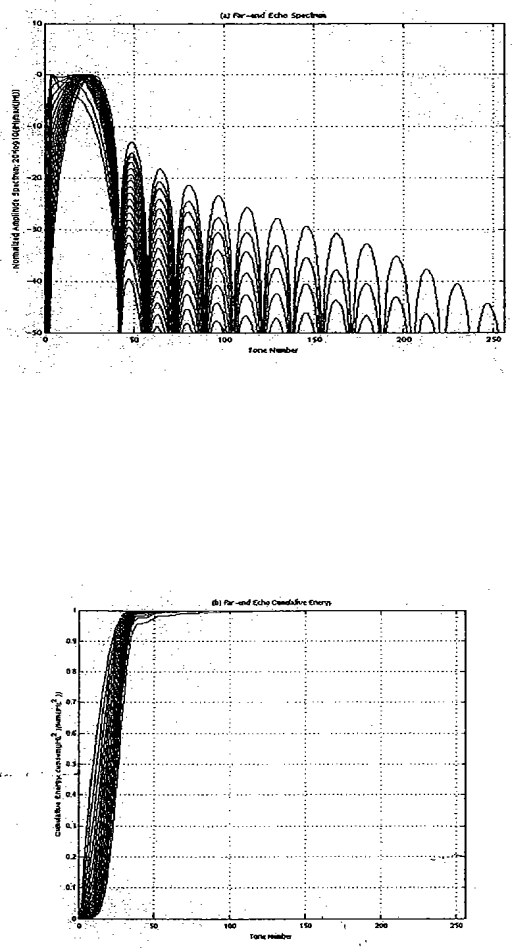
(a) Par-and Echo Spectrum
Tone Number
(b) Par-and Echo Cumulative Energy
Tone Number

Fig. 3

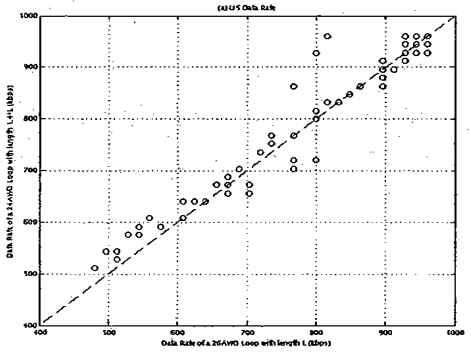

Fig. 4a

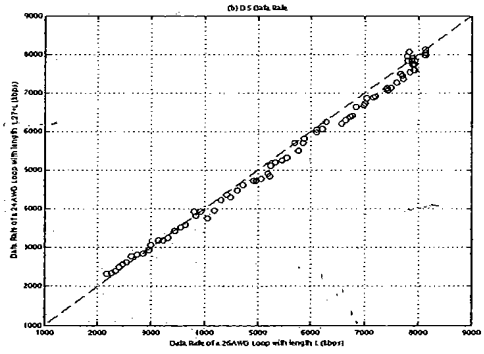

Fig. 4b

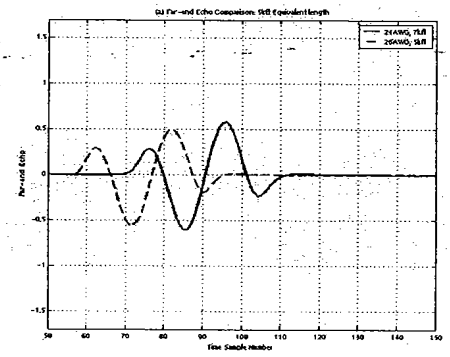

Fig. 5a

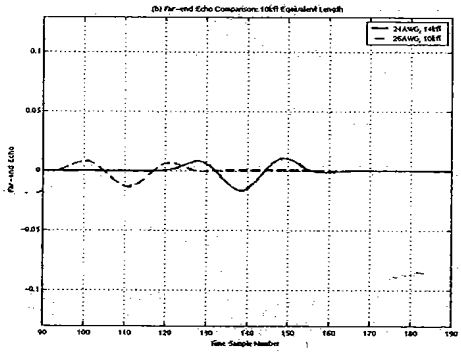

Fig. 5b

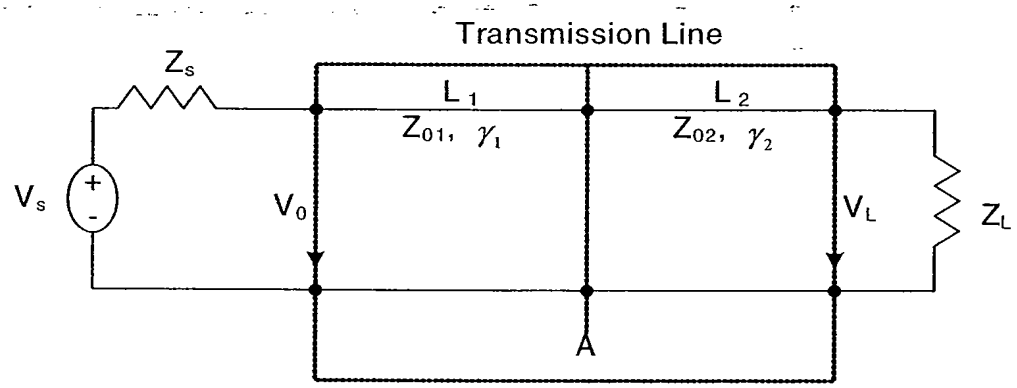

Fig. 6

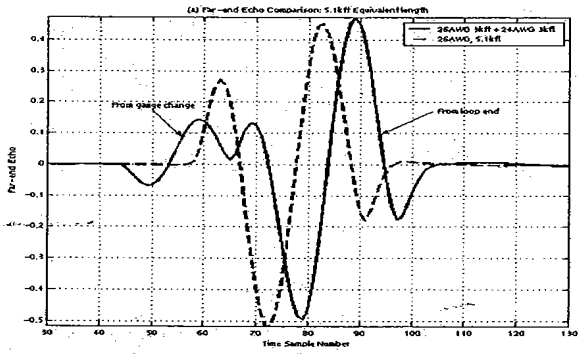

Fig. 7a

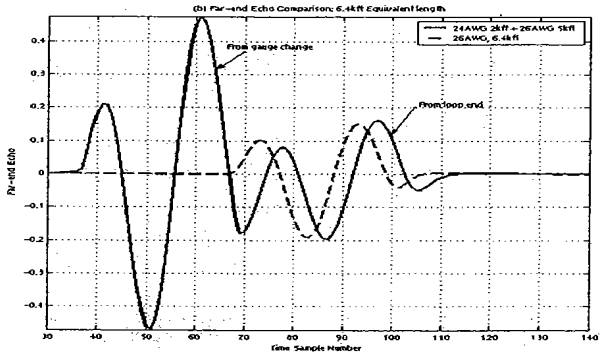

Fig. 7b

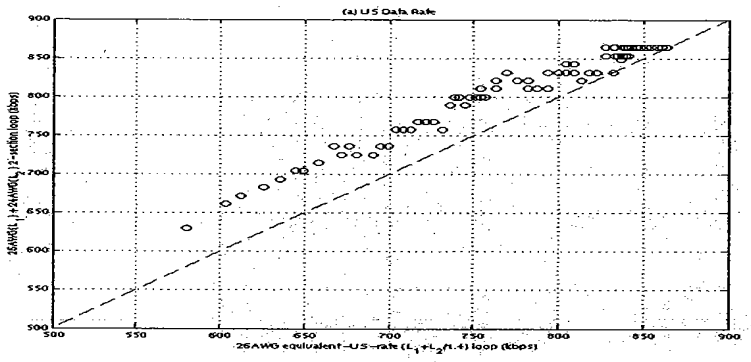
(a) US Data Rate
900
850
800
750
700
650
600
550
500
500
550
600
650
700
750
800
850
900
26AWG equivalent-US-rate (L_1+L_2(1.4) loop (kbps)

Fig. 8a

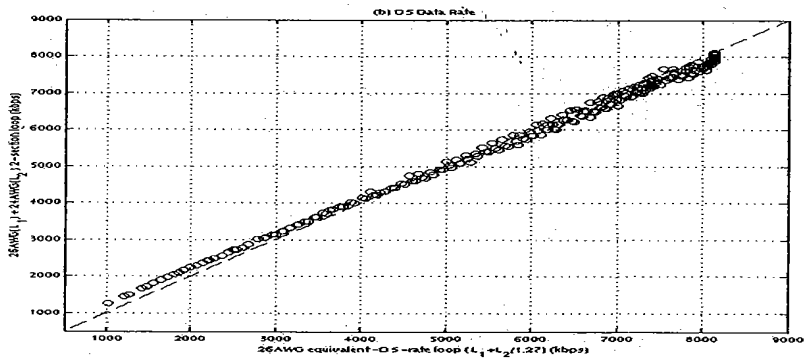
(b) DS Data Rate
9000
8000
7000
6000
5000
4000
3000
2000
1000
1000
2000
3000
4000
5000
6000
7000
8000
9000
26AWG equivalent-DS-rate loop (L_1+L_2(1.22) (kbps)

Fig. 8b

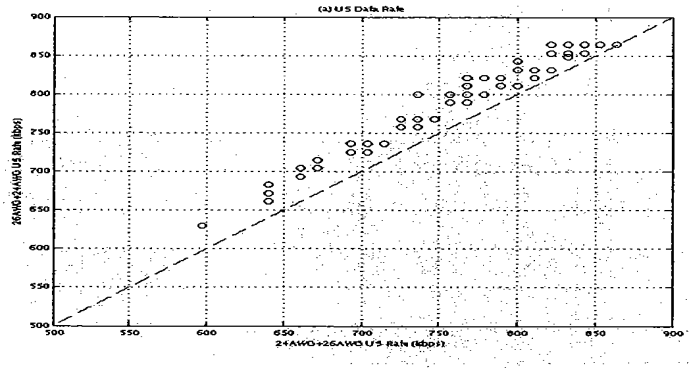
(a) US Data Rate
900
850
800
750
700
650
600
550
500
300
350
400
450
500
550
600
650
700
750
800
850
900
26AWG+24AWG US Rate (kbps)
24AWG+26AWG US Rate (kbps)

Fig. 9a

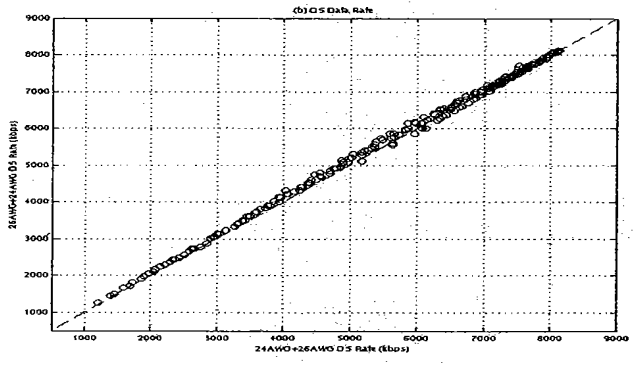
(b) DS Data Rate
9000
8000
7000
6000
5000
4000
3000
2000
1000
1000
2000
3000
4000
5000
6000
7000
8000
9000
26AWG+24AWG DS Rate (kbps)
24AWG+26AWG DS Rate (kbps)

Fig. 9b

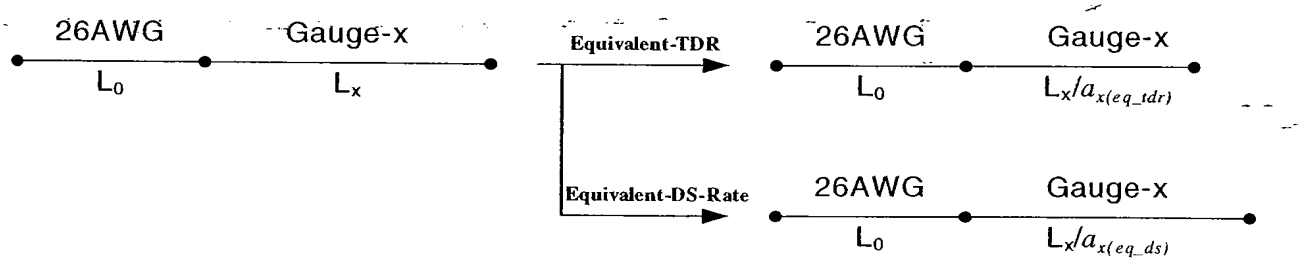
26AWG
Gauge-x
L_0
L_x
Equivalent-TDR
26AWG
Gauge-x
L_0
$L_x/a_{x(eq_tdr)}$
Equivalent-DS-Rate
26AWG
Gauge-x
L_0
$L_x/a_{x(eq_ds)}$

Fig. 10

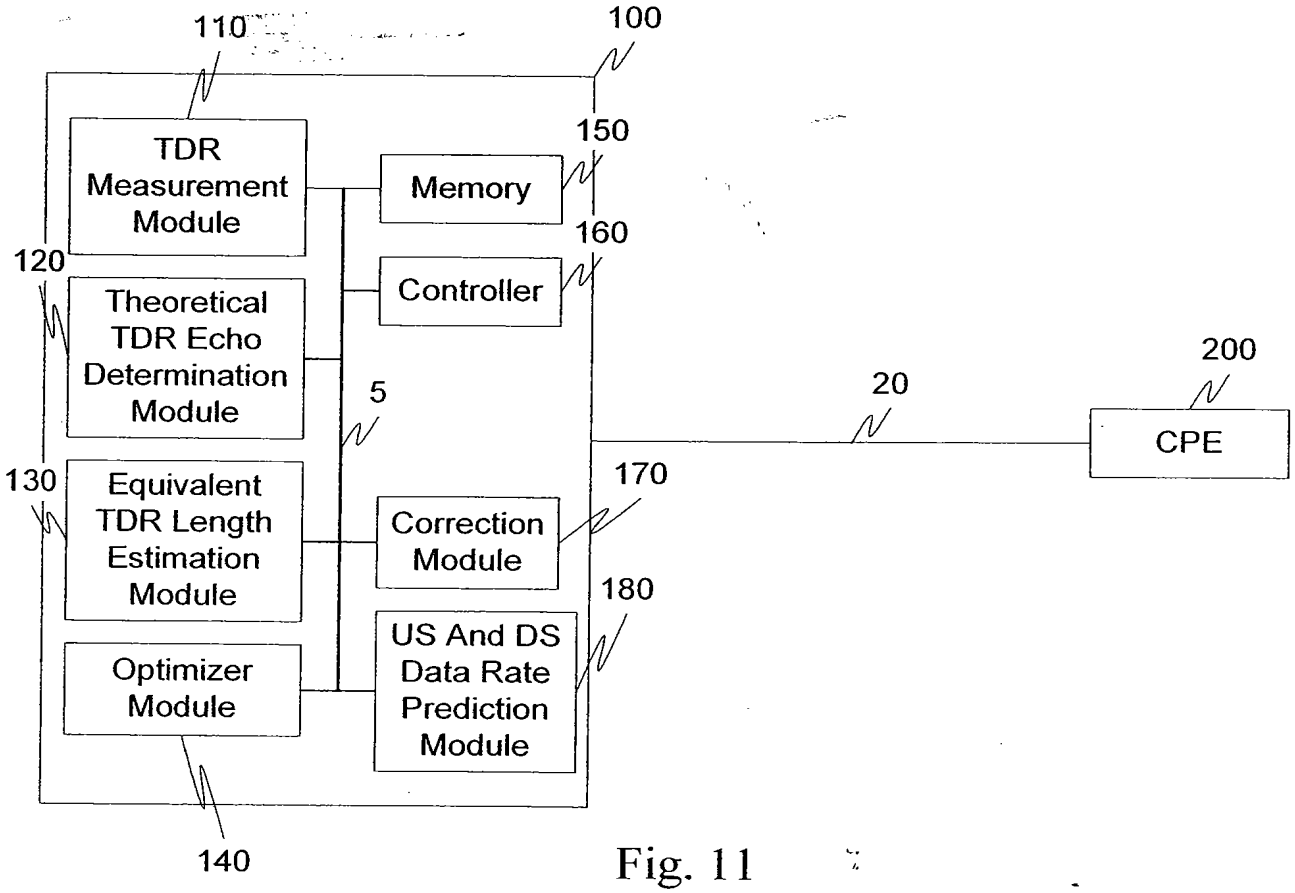
110
100
TDR Measurement Module
150
Memory
160
120
Theoretical TDR Echo Determination Module
Controller
5
20
200
CPE
130
Equivalent TDR Length Estimation Module
170
Correction Module
180
US And DS Data Rate Prediction Module
Optimizer Module
140

Fig. 11

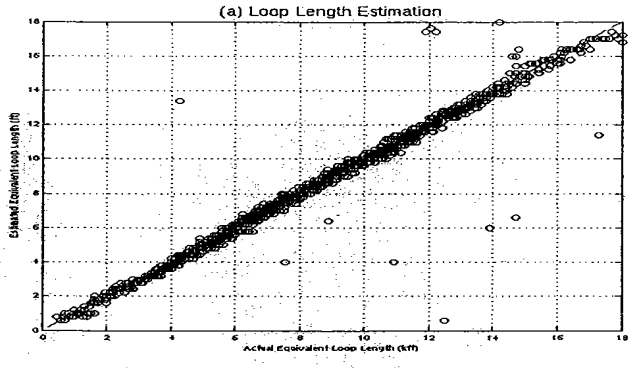

Fig. 12a

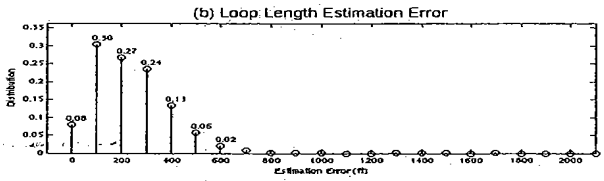

Fig. 12b

|Error| == 0 ft : 0.078
|Error| <= 100 ft : 0.38
|Error| <= 200 ft : 0.64
|Error| <= 300 ft : 0.83
|Error| <= 400 ft : 0.92
|Error| <= 500 ft : 0.96
|Error| <= 600 ft : 0.98
|Error| <= 700 ft : 0.99

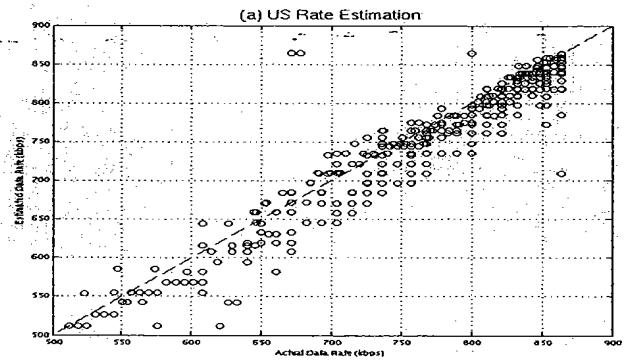

Fig. 13a

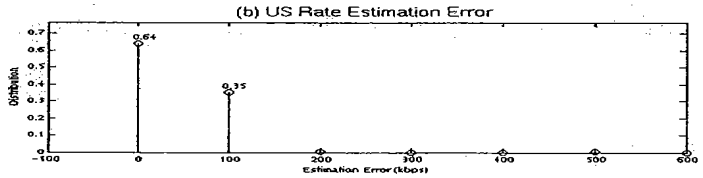

Fig. 13b

|Error| == 0 kbps : 0.64
|Error| <= 100 kbps : 0.99
|Error| <= 200 kbps : 1
|Error| <= 300 kbps : 1
|Error| <= 400 kbps : 1
|Error| <= 500 kbps : 1

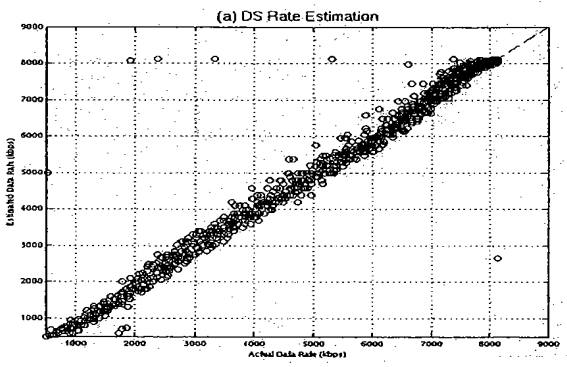

Fig. 14a

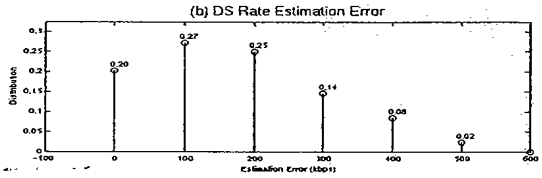

Fig. 14b

|Error| == 0 kbps : 0.2
|Error| <= 100 kbps : 0.47
|Error| <= 200 kbps : 0.72
|Error| <= 300 kbps : 0.87
|Error| <= 400 kbps : 0.95
|Error| <= 500 kbps : 0.97

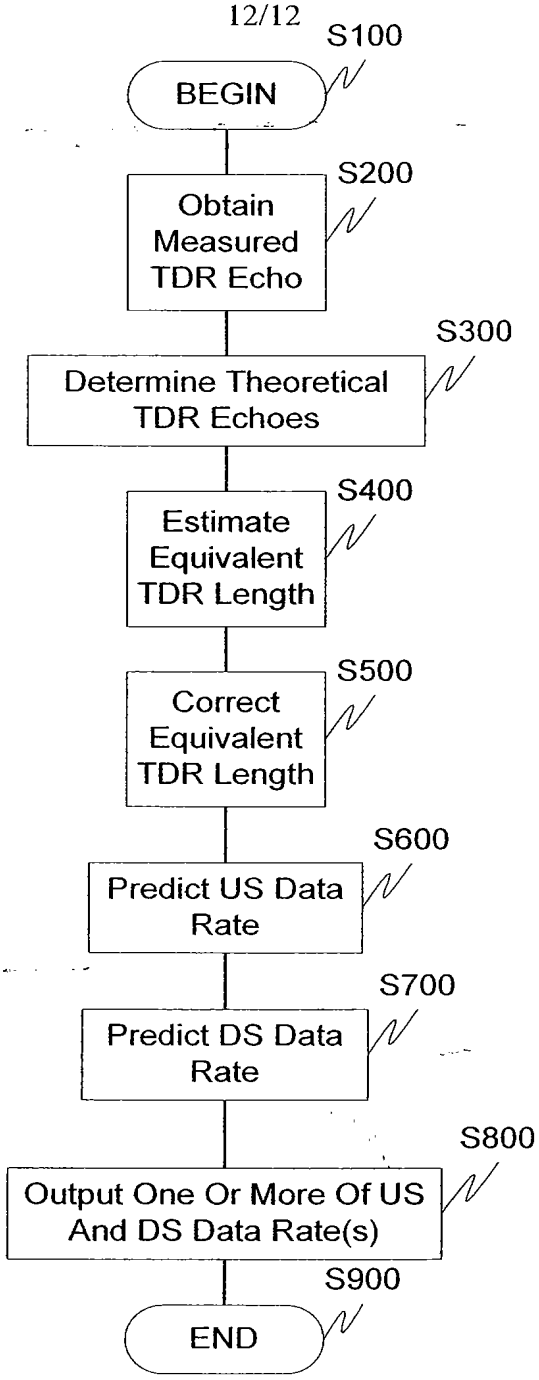
S100
BEGIN
S200
Obtain Measured TDR Echo
S300
Determine Theoretical TDR Echoes
S400
Estimate Equivalent TDR Length
S500
Correct Equivalent TDR Length
S600
Predict US Data Rate
S700
Predict DS Data Rate
S800
Output One Or More Of US And DS Data Rate(s)
S900
END

Fig. 15